Reply to reviewer #1

Reviewer's Comment	Author's reply	Action
Authors assume that vertical direction is a principal direction throughout the modelled volume. But a recent paper by Maury et al. (2014) have suggested that in this area the stress field at depth is controlled by the fossil Alpine subduction. More precisely the steeply dipping Lithosphere-Asthenosphere contact encountered around 50 to 70 km in this area supports only a pressure so that along this contact none of the principal directions are vertical.	We agree with the reviewer that the vertical direction cannot be assumed as a principal stress axes everywhere. We do not assume this in the model. We only make this assumption when talking about the reduced stress tensor (Zoback, 2010) in conjunction with collecting data for calibration. We added a sentence to highlight this.	"Only the orientation of the reduced stress tensor and to a lesser extent information on the stress regime are relatively good estimated from stress indicators." p3, l7-8
Authors should better document the topography of the sediment-basement contact at the 70 km x 70 km scale, for it is likely not horizontal. In other words, in order to be credible, the model should extend much deeper than 10 km, given its 70 x 70 km horizontal extent.	We acknowledge that our wording might be not detailed enough here. Indeed, the topography of the sediment-basement contact is not horizontal but a surface just like any other surface between geological bodies in the model. It is documented in detail in the model published by Przybycin (2015, referenced in the manuscript). The bottom of the model however is a horizontal surface which is entirely composed of basement/Upper Crust rock. We modified our wording accordingly. In contrary to the mentioned modelling approach by Maury et al. (2014) our presented modelling approach deals with the stress state in the upper crust. It has been shown by Reiter & Heidbach (2014) and Hergert et al. (2011) that the geometry of the Moho and other very deep structures only play a very minor part in the modelling of the stress state of the upper crust. Especially in light of the	- "The part of the structural model used for the geomechanical model has a size of 70x70 km² and is referred to as the root model. It includes the sediments in the Molasse Basin in their entire vertical extent. The bottom of the model is situated at a depth of 9 km entirely within the Upper Crust." p4, l17ff - In several instances we emphasized that the model is only for the upper part of the crust. - We discuss the influence of deep processes in section 7.4 model dependent reliability

	large uncertainties mainly due to the SHmax magnitude and material properties it is justified to concentrate on those larger uncertainties.	
Another important issue concerns the validity of an elastic hypothesis for modelling the present day stress field. Indeed, recent GPS measurements show no present day measurable displacement in this area so that the displacement considered by authors as boundary conditions are likely to be associated with the Alpine tectonics…	We agree with the reviewer that the application of displacement boundary conditions derived from a measured displacement are in this case not a valid method to calibrate the model. Again our wording was not detailed here and we modified it accordingly. We only use displacement boundary conditions to initiate the stress field. We do not calibrate the model on the prescribed displacement but on the stresses which are modelled by the application of displacement boundary conditions. In other words, we do not place any significant meaning on the amount of displacement applied to the model.	"Dirichlet boundary conditions (i.e. displacements) are applied to the sidewalls of the model to create horizontal differential stresses. The boundary conditions are adjusted in a way that the modelled magnitude of S_{Hmax} and S_{hmin} at the calibration points fit the observed magnitudes." p6, l23ff
Also of import are the stress discontinuities observed at the limits between the various geomaterials. Is there no limit to the maximum "stress jump" described on figure 8 ?	The "stress jumps" which are observed at the contacts between different geomaterials are regularly observed in situations where two materials of very different elastic properties are in contact to each other. In the real world these jumps are possibly smoother since the associated contact zone has evolved with time and are hence not as "jumpy" and sudden as in the model. Such a smoother transition is possible to realise in a model. However, the limited and missing knowledge of the actual contact behaviour at depth shows that such an approach is not beneficial because the uncertainties would increase dramatically.	-

Finally, the classical proposition that the criticality of faults is well described by a Coulomb type failure mechanism requires also a better discussion. Indeed, some not so recent work suggests that the mechanical behavior of faults is not properly represented by a Coulomb failure criterion. The role of long term stress relaxation in the gauge material should be discussed.	We agree with the reviewer that more accurate failure criteria than Mohr-Coulomb do exist. Such more elaborate criteria can also be applied to analyse our model results. However, as for example shown by Sulem (2007) more accurate failure criteria are dependent on high quality information of the rock material. We do not have access to such data for the according materials and thus the uncertainties would be very high when assuming standard values. Hence in this example we remain with the more basic but still frequently applied Mohr-Coulomb criteria. That does by no means imply that our presented approach does not support the application of more elaborate failure criteria. On the contrary the model results can be analysed with all kinds of failure criteria. However, in the lights of the already high uncertainties we refrained from adding even more uncertainties by the application of a failure criterion which is very exact for a specific rock but might not be applicable for the material in our model. We added a sentence to explain this issue.	“It is used to assess the criticality of reservoirs which can be quantified by scalar values such as slip tendency. If detailed information on the fracture behaviour of the rock are known more elaborate fracture criteria than Mohr-Coulomb (e.g. Sulem2007, Zang2010)can be applied to analyse the model results.” p11, l33ff